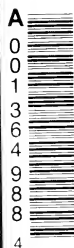


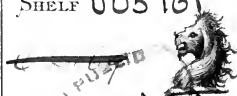
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CIVIL ENGINEER



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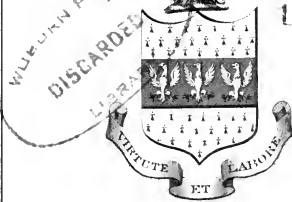
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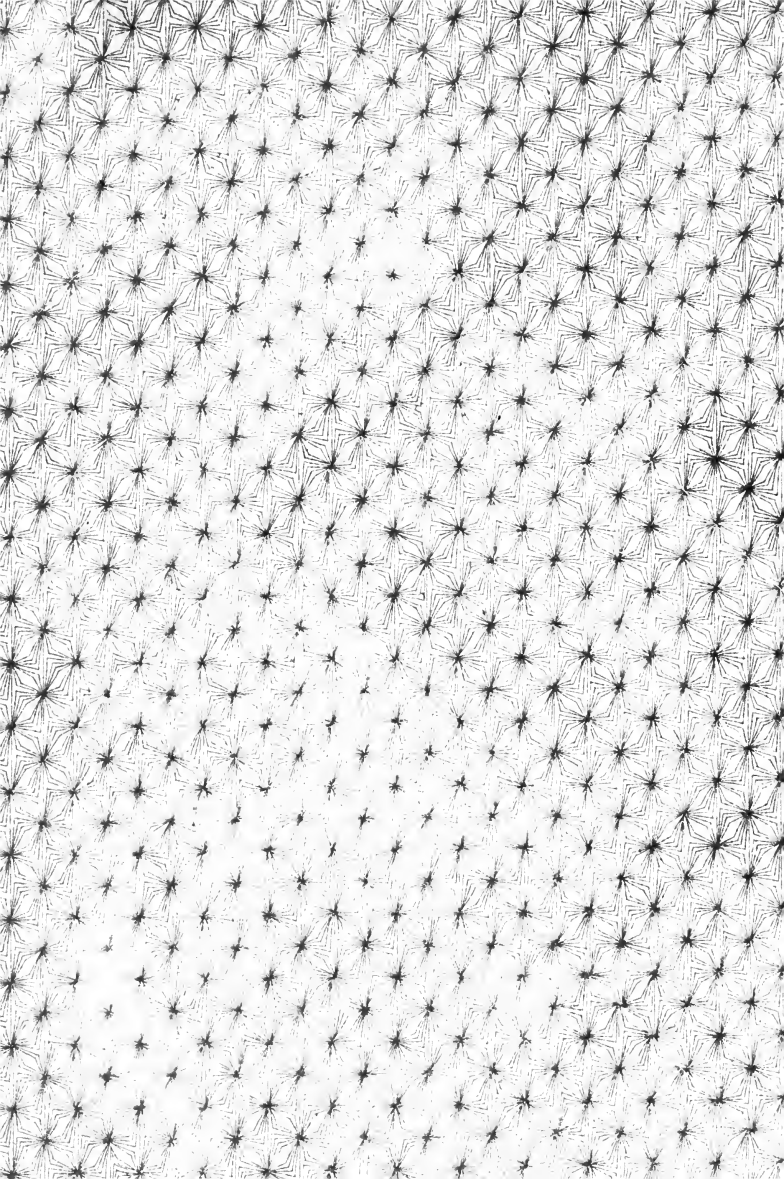


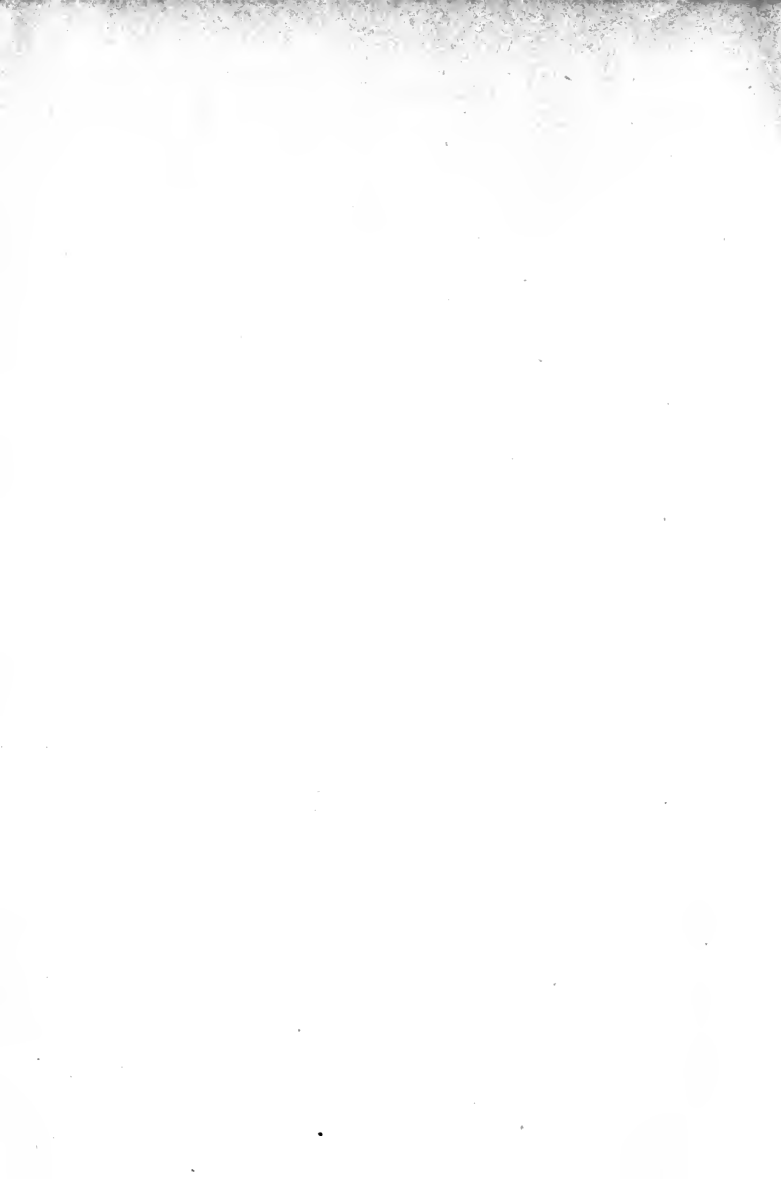
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A SKETCH

OF

THE LIFE AND WORKS

OF

GEORGE W. WHISTLER

Civil Engineer

BY

GEORGE L. VOSE

PRESIDENT OF THE BOSTON SOCIETY OF CIVIL ENGINEERS

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BOSTON

LEE AND SHEPARD, PUBLISHERS

NEW YORK

CHARLES T. DILLINGHAM

1887

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## NOTE.

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I N placing my name upon the titlepage of this sketch, I do so more as a compiler than as an author. My only object has been to collect such facts, from those of our older engineers who knew Major Whistler, as would enable me to place before the younger members of the profession some record of one of its most brilliant ornaments; to hold up an illustrious example of all that is worthy of imitation; to show them something of one who was equally admired as an engineer, and beloved as a man. Whatever of value may be found in the sketch must be credited to that rapidly decreasing band of veteran engineers who have recalled for me their early years and their early labors; men who saw the beginning of the railroad system in America, and many of whom had the good fortune to begin

their career under the great master whose memory is so fondly cherished by all who were connected with him. Not only have I availed myself to the fullest extent of the recollections of these men, without which I could have done nothing; but I have also used their exact language whenever I could, as the reader is thus placed in closer communication with the subject of the sketch than would be possible in any other way. It is a most delightful thing to see how the old enthusiasm and the youthful admiration of these veterans in the profession kindle anew as they recall their early service under Major Whistler. It was indeed no common man who could so inspire his assistants and associates, and who could leave so indelible an impression, not only upon their minds, but in their hearts.

I am especially indebted for the material which is here presented, to Gen. George S. Greene of New York, to Col. Julius W. Adams of Brooklyn, to Messrs. William Raymond Lee and Charles S. Storow of Boston, to James B. Francis of Lowell, and to the late E. S. Chesborough of Chicago, nearly all of whom in their early life were associated with Major Whistler. I am also under obligations to

Dr. William Gibbs McNeill Whistler of London, to G. H. Prince, Esq., of St. Petersburg, to Messrs. William E. Worthen and John Bogart of New York, to Mrs. Gen. D. H. Rucker of Washington, to Lieut. G. N. Whistler of the United-States Army, to Thomas D. Whistler of Tarrytown, to the superintendent of the United-States Military Academy, to Dr. George D. Stanton of Stonington, to Samuel Nott of Hartford, to E. H. Hazard of Providence, and to John B. Winslow and Joseph Ropes of Boston. The officers of the several libraries in Boston, and of the historical societies in Massachusetts, Rhode Island, and Connecticut, have aided me in many ways in obtaining information; and the managers of the several railroads with which Major Whistler was connected have given me access at all times to their archives.

The portrait facing the titlepage is from an engraving published in New York about the time of Major Whistler's death, and shows him in the prime of manhood. It is considered an excellent likeness by those who knew him.

In conclusion, I may use the words of one of America's foremost engineers, who even as I write

has closed his long and useful life, leaving behind a reputation unsurpassed for sound judgment, great practical ability, and the most sterling worth: "Whenever the true historian of civil engineering in this country shall arise, he will give to Major Whistler a position of which its younger members to-day appear to have no conception, and of which many of the older appear to have very inadequate ideas."

G. L. V.

## GEORGE W. WHISTLER.

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FEW persons, even among those best acquainted with our modern railroad system, are aware of the early struggles of the men to whose foresight, energy, and skill the new mode of transportation owes its introduction into this country. The railroad problem in the United States was quite a different one from that in Europe. Had we simply copied the railways of England, we should have ruined the system at the outset for this country. In England, where the railroad had its origin, money was plenty, the land was densely populated, and the demand for rapid and cheap transportation already existed. A great many short lines connecting the great centres of industry were required, and for the construction of such in the most substantial manner the money was easily obtained. In America, on the contrary, a land of enormous extent, almost entirely undeveloped, but of great possibilities, lines of hundreds and even

thousands of miles in extent were to be made, to connect cities as yet unborn, and to accommodate a future traffic of which no one could possibly foresee the amount. Money was scarce, and in many districts the natural obstacles to be overcome were infinitely greater than any which had presented themselves to European engineers.

By the sound practical sense and the unconquerable will of George Stephenson, the numerous inventions which together made up the locomotive-engine had been combined in a machine, which, in connection with the improved roadway, was to revolutionize the transportation of the world. The railroad as a machine was invented. It remained to apply the new invention in such a manner as to make it a success, and not a failure. To do this in a new country like America, required infinite skill, unbounded energy, the most careful study of local conditions, and the exercise of well-matured, sound business judgment. To see how well the great invention has been applied in the United States, we have only to look at the network of iron roads which now reaches from the Great Lakes to the Gulf of Mexico, and from the Atlantic to the Pacific.

With all the experience we have had, it is not an easy problem, even at the present time, to determine how much money we are authorized to spend

upon the construction of a given railroad. To secure the utmost benefit, at the least outlay, regarding both the first cost of building the road, and the perpetual cost of operating it, is the railroad problem which is, perhaps, less understood at the present day than any other. It was an equally important problem fifty years ago, and certainly not less difficult at that time. It was the fathers of the railroad system in the United States who first perceived the importance of this problem, and who, adapting themselves to the new conditions presented in this country, undertook to solve it. Among the pioneers in this branch of engineering, no one has done more to establish correct methods, or has left behind a more enviable or a more enduring fame, than Major George W. Whistler.

The Whistler family is of English origin, and is found towards the end of the fifteenth century in Oxfordshire, at Goring and Whitechurch, on the Thames. One branch of the family settled in Sussex, at Hastings and Battle, being connected by marriage with the Websters of Battle Abbey, in which neighborhood some of the family still live. Another branch lived in Essex, from which came Dr. Daniel Whistler, president of the College of Physicians in London in the time of Charles II., a person frequently mentioned in "Pepys' Diary." From the Oxfordshire branch came Ralph, son of Hugh Whistler

of Goring, who went to Ireland, and there founded the Irish branch of the family; being the original tenant of a large tract of country in Ulster under one of the guilds, or public companies, of the city of London. From this branch of the family came Major John Whistler, father of the distinguished engineer, and the first representative of the family in America. It is stated that in some youthful freak he ran away, and enlisted in the British army. It is certain that he came to this country during the Revolutionary War, under Gen. Burgoyne, and remained with his command until its surrender at Saratoga, when he was taken prisoner of war. Upon his return to England he was honorably discharged; and soon after, forming an attachment for a daughter of Sir Edward Bishop, a friend of his father, he eloped with her, and came to this country, settling at Hagerstown in Maryland. He soon after entered the army of the United States, and served in the ranks, being severely wounded in the disastrous campaign against the Indians under Major-Gen. St. Clair, in the year 1791. He was afterwards commissioned as lieutenant, rose to the rank of captain, and later had the brevet of major. At the reduction of the army in 1815, having already two sons in the service, he was not retained; but in recognition of his honorable record, he was appointed military-storekeeper at Newport, Ky., from which post he was

afterwards transferred to Jefferson Barracks, a short distance below St. Louis, where he lived to a good old age, and died, and was buried.

Major John Whistler had a large family of sons and daughters, among whom we may note particularly : William, who became a colonel in the United-States Army, and who died at Newport, Ky., in 1863 ; John, a lieutenant in the army, who died of wounds received in the battle of Maguago, near Detroit, in 1812 ; and George Washington, the subject of our sketch. Major John Whistler was not only a good soldier, and highly esteemed for his military services, but was also a man of refined tastes and well educated ; being an uncommonly good linguist, and especially noted as a fine musician. In his family he is stated to have united firmness with tenderness, and to have impressed upon his children the importance of a faithful and thorough performance of duty, in whatever position they should be placed.

George Washington Whistler, the youngest son of Major John Whistler, was born on the 19th of May, in the year 1800, at Fort Wayne, in the present State of Indiana, but then a part of the North-west Territory, his father being at the time in command of that post. Of the boyhood of George Whistler we have no record, except that he followed his parents from one military station to another, receiving his early educa-

tion, for the most part, at Newport, Ky., from which place, on July 31, 1814, he was appointed a cadet to the United - States Military Academy, being then fourteen years of age.

The course of the student at West Point was a very satisfactory one. Owing to a change in the arrangement of classes after his entrance, he had the advantage of a longer term than had been given to those who preceded him, remaining five years under instruction. His record during his student life was good throughout. In a class of thirty members he stood number one in drawing, number four in descriptive geometry, number five in drill, number eleven in philosophy and in engineering, number twelve in mathematics, and number ten in general merit. He was remarkable, says one who knew him at this time, for his frank and open manner, and for his pleasant and cheerful disposition. A good story is told of the young cadet, which shows his ability, even at this time, to make the best of circumstances apparently untoward, and to turn to his advantage his surroundings, whatever they might be. Having been, for some slight breach of discipline, required to bestride a gun in the campus for a short time, he saw, to his dismay, coming down the walk the beautiful daughter of Dr. Foster Swift, a young lady who, visiting West Point, had taken the hearts of the cadets by storm; and who,

little as he may at the time have dreamed it, was destined to become his future wife. Pulling out his handkerchief, he bent over his gun, and appeared absorbed in cleaning the most inaccessible parts of it with such vigor as to be entirely unaware that any one was passing; nor did the young lady dream that a case of discipline had been before her, until in after years, when on a visit to West Point, an explanation was made to her by her husband.

It was at this time of his life, that the refinement and taste for which Major Whistler was ever after noted began to show itself. An accomplished scientific musician and performer, he gained a reputation in this direction beyond that of a mere amateur, and scarcely below that of the professionals of the day. His nickname, "Pipes," which his skill upon the flute at this time gave him, adhered to him through life among his intimates in the army. His skill with the pencil, too, was something phenomenal, and would, but for more serious duties, have made him as distinguished an artist as he was an engineer. Fortunately for the world, this talent descended to one of his sons, and in his hands has had full development. These tastes in Whistler appeared to be less the results of study on his part than the spontaneous outgrowth of a refined and delicate organization, and so far constitutional with him that they seemed to tinge.

his entire character. They continued to be developed till past the meridian of life, and amid all the pressure of graver duties furnished a most delightful relaxation.

Upon completing his course at the Military Academy, he was graduated, July 1, 1819, and appointed second lieutenant in the Corps of Artillery. From this date until 1821 he served, part of the time on topographical duty, and part of the time he was in garrison at Fort Columbus. From Nov. 2, 1821, to April 30, 1822, he was assistant professor at the Military Academy, a position for which his attainments in descriptive geometry and his skill in drawing especially fitted him. This employment, however, was not altogether to his taste. He was too much of an artist to wish to confine himself to the mechanical methods needed in the training of engineering students. In 1822, although belonging to the artillery, he was detailed on topographical duty, under Major (afterwards Col.) Abert, and was connected with the commission employed in tracing the international boundary between Lake Superior and the Lake of the Woods. This work continued during the four years from 1822 to 1826, and subsequent duties in the cabinet of the commission employed nearly two years more. The field service of this engagement was any thing but light work; much of it being performed in the depth of winter, with a temperature fifty degrees below

zero. The principal food of the party was tallow and some other substance, which was warmed over a fire on stopping at night. The snow was then removed to a sufficient depth for a bed, and the party wrapped one another up in their buffalo-robcs until the last man's turn came, when he had to wrap himself up the best he could. In the morning, after warming their food and eating, the remainder was allowed to harden in the pan, after which it was carried on the backs of men to the next stopping-place. The work was all done upon snow-shoes; and occasionally a man became so blinded by the glare of the sun upon the snow, that he had to be led by a rope.

Upon the 1st of June, 1821, Whistler was made second lieutenant in the First Artillery in the re-organized army. On the 16th of August, 1821, he was transferred to the Second Artillery; and on the 16th of August, 1829, he was made first lieutenant. Although belonging in the artillery, he was assigned to topographical duty almost continually until Dec. 31, 1833, when he resigned his position in the army. A large part of his time during this period was spent in making surveys, plans, and estimates for public works; not merely those needed by the National Government, but others, which were undertaken by chartered companies in different parts of the United States. There were at that time very few educated engineers in the

country besides the graduates of the Military Academy; and the army engineers were therefore frequently applied for by private corporations, and for several years Government granted their services.

Prominent among the early works of internal improvement was the Baltimore and Ohio Railroad; and the managers of this undertaking had been successful in obtaining the services of several officers who were then eminent, or afterwards became so. The names of Dr. Howard, — who, though not a military man, had been attached to the corps of engineers, — of Lieut.-Col. Long, and of Capt. William Gibbs McNeill, appear in the proceedings of the company as “Chiefs of Brigade;” and those of Fessenden, Gwynne, and Trimble, among the assistants.

In October, 1828, this company made a special request for the services of Lieut. Whistler. The directors had resolved on sending a deputation to England to examine the railroads of that country; and Jonathan Knight, William Gibbs McNeill, and George W. Whistler were selected for this duty. They were also accompanied by Ross Winans, whose fame and fortune, together with that of his sons, became so widely known afterwards in connection with the great Russian railway. Lieut. Whistler was chosen for this service, says one who knew him well, on account of his remarkable thoroughness in all the details of his profession, as well as

for his superior qualifications in other respects. The party left this country in November, 1828, and returned in May, 1829.

In the course of the following year, the organization of the road, a part of which had already been constructed under the immediate personal supervision of Lieut. Whistler, assumed a more permanent form, and allowed the military engineers to be transferred to other undertakings of a similar character. Accordingly, in June, 1830, Capt. McNeill and Lieut. Whistler were sent to the Baltimore and Susquehanna Railroad, for which they made the preliminary surveys and a definite location; and upon which they remained until about twenty miles were completed, when a lack of funds caused a temporary suspension of the work. In the latter part of 1831, Lieut. Whistler went to New Jersey to aid in the construction of the Paterson and Hudson-River Railroad (now a part of the Erie Railway). Upon this work he remained until 1833, at which time he moved to Connecticut to take charge of the location of the railroad from Providence to Stonington, a line which had been proposed as an extension of the road already in process of construction from Boston to Providence.

In this year, Dec. 31, 1833, Lieut. Whistler resigned his commission in the army; and this not so much from choice as from a sense of duty. Hitherto his work as

an engineer appears to have been more in the nature of an employment than a vocation. He carried on his undertakings diligently, as it was his nature to do, but without much anxiety or enthusiasm; and he was satisfied with meeting difficulties, as they came up, with a sufficient solution. Henceforward he followed his profession from a love of it. He labored that his resources against the demands of matter and space should be over-abundant; and if he had before been content with the sure-footed facts of observation, he now added the luminous aid of study. How luminous and how sure these combined became, his later works show best.

In 1834 Mr. Whistler accepted the position of engineer to the Proprietors of Locks and Canals at Lowell. This position gave him, among other things, the direction of the machine-shops, which had been made principally for the construction of locomotive engines. The Boston and Lowell Railroad, which at this time was in process of construction, had imported a locomotive from the works of George and Robert Stephenson at Newcastle, and this engine was to be reproduced, not only for the use of the Lowell road, but for other railways as well; and to this work Whistler gave a large part of his time from 1834 to 1837. The making of these engines illustrated well the features in his character which then and ever after were of the utmost

value to those for whom he worked. It shows the self-denial with which he excluded any novelties of his own, the caution with which he admitted those of others, and the judgment which he exercised in selecting and combining the most meritorious of existing arrangements. His preference for what was simple and had been tried did not arise from a want of originality, as he had abundant occasion to show during the whole of his engineering life. He was, indeed, uncommonly fertile in expedients, as all who knew him testify; and the greater the demand upon his originality, the higher did he rise to meet the occasion. The time spent in Lowell was not only to the great advantage of the company, but it increased also his own stores of mechanical knowledge, and in a direction, too, which in later years was of especial value to him.

In 1837 the condition of the Stonington Railroad became such as to demand the continual presence and attention of the engineer. Mr. Whistler, therefore, moved to Stonington, a place to which he became much attached, and to which he seems during all of his wanderings to have looked with a view of making it finally his home. While engaged upon the above work, he was consulted in regard to many other undertakings in different parts of the country; and prominent among these was the Western Railroad of Massachusetts.

This great work, remarkable for the boldness of its engineering, was to run from Worcester through Springfield and Pittsfield to Albany. To surmount the highlands dividing the waters of the Connecticut from those of the Hudson, called for engineering cautious and skilful, as well as heroic. The line from Worcester to Springfield, though apparently much less formidable, and to one who now rides over the road showing no very marked features, demanded hardly less study; as many as twelve several routes having been examined between Worcester and Brookfield. To undertake the solution of a problem of so much importance, required the best of engineering talent; and we find associated in this work the names of three men who in the early railroad enterprises of this country stood deservedly in the front rank,—George W. Whistler, William Gibbs McNeill, and William H. Swift. McNeill had graduated from the Military Academy in 1817, and risen to the rank of major in the topographical engineers. Like Whistler, he had been detailed to take charge of the design and construction of many works of internal improvement not under the direction of the General Government. These two engineers exercised an influence throughout the country for many years, much greater than that of any others. Indeed, there were very few works of importance undertaken at that time, in connection with

which their names do not appear. This alliance was further cemented by the marriage between Whistler and McNeill's sister. Capt. William H. Swift had also graduated from the Military Academy, and had already shown marked ability as an engineer. Such were the men who undertook the location and construction of the railroad which was to surmount the highlands between the Connecticut and the Hudson, and to connect Boston with the Great West.

The early reports of these engineers to the directors of the Western Railroad show an exceedingly thorough appreciation of the complex problem presented to them, and a much better understanding of the principles involved in establishing the route than seems to have been shown in many far more recent works. In these early reports, made in 1836 and 1837, we find elaborate discussions as to the power of the locomotive engine; and a recognition of the fact, that in comparing different lines we must regard the *plan* as well as the *profile*, "as the resistance from curves on a level road may even exceed that produced by gravity on an incline;" and in one place we find the ascents "*equated* at eighteen feet, the slope which requires double the power needed on a level road," resulting in a "*virtual increase*." We find also a very clear expression of the fact that an increased expenditure in the power needed to operate the completed road

may overbalance a considerable saving in first cost. To bear this principle in mind, and at the same time to work in accordance with the directors' ideas of economy, in a country where the railroad was regarded very largely as an experiment, was by no means an easy task. The temptation to make the first cost low, at the expense of the quality of the road, in running up the valley of the Westfield River, was very great, and the directors were at one time very strongly urged to make an exceedingly narrow and crooked road west of Springfield; but Major Whistler so convinced the president, Thomas B. Wales, of the folly of such a course, that the latter declared with a most emphatic prefix that he would have nothing to do with such a twopenny cow-path, and thus prevented its adoption.

Major Whistler had many investigations to make concerning the plans and policy of railroad companies, at a time when almost every thing connected with them was comparatively new and untried. When he commenced, there was no passenger-railroad in the country, and but very few miles of quarry and mining track. If at that time an ascent of more than one in two hundred was required, it was thought necessary to have inclined planes and stationary power. It was supposed that by frequent relays it would be possible to obtain for passenger-cars a speed of eight or nine miles an hour. Almost nothing was known of the

best form for rails, of the construction of the track, or of the details for cars or engines. In all of these things Major Whistler's highly gifted and well-balanced mind enabled him to judge wisely for his employers, and to practise for them the truest economy.

Major Whistler's connection with the Western Railroad began while he was still engaged upon the Stonington Line. Associated with his friend McNeill, he acted as consulting engineer for the Western road from 1836 to 1840. From 1840 to 1842 he was its chief engineer, with his headquarters at Springfield. The steep grades west of the Connecticut presented not only a difficult problem in location, but in locomotive engineering as well. At the present day we can order any equipment which may best meet the requirement upon any railroad, and the order will be promptly met by any one of our great manufactories; but in the early days of the Western Railroad it was far otherwise, and the locomotive which should successfully and economically surmount with heavy trains a grade of over eighty feet to the mile was yet to be seen. The Messrs. Winans of Baltimore had built some nondescript machines, which had received the name of "crabs," and had tried to make them work upon the Western road; but after many attempts they were finally given up as unfit for such service. These "crabs" were eight-wheeled engines, weighing about

twenty tons, with a vertical boiler. The wheels were three feet and a half in diameter; but the engine worked on to an intermediate shaft, which was connected with the driving-wheels in such a manner as to get the effect of a five-feet wheel. These engines did not impress Major Whistler at all favorably. His experience in Lowell was here of great value to him; and he had become convinced that the engine of George Stephenson was, in the main, the coming machine, and needed but to be properly proportioned, and of sufficient size, to meet every demand.

With Major Whistler's work upon the Western Railroad, his engineering service in this country concluded, and that by an occurrence which marked him as one of the foremost engineers of his time. Patient, indefatigable, cautious, remarkable for exhaustless resource, admirable judgment, and the highest engineering skill, he had begun with the beginning of the railroad system, and had risen to the chief control of one of the greatest works in the world,—the Western Railroad of Massachusetts. Not only had he shown the most far-sighted wisdom in fixing the general features of this undertaking; but no man surpassed him, if indeed any one equalled him, in an exact and thorough knowledge of technical details. To combine the various elements in such a manner as to produce the greatest commercial success, and to make the railroad in the widest

sense of the word a public improvement, never forgetting the amount of money at his disposal, was the problem he had undertaken to solve. He had proved himself a great master in his profession, and had shown how well fitted he was to grapple with every difficulty. He was equally a man of science and a man of business; and to all this he added the most delicate sense of honor, and the most spotless integrity. He was in the prime of manhood, and was prepared to enter upon the great work of his life.

It was not long after the introduction of the railroad, that intelligent persons saw very plainly that the new mode of transportation was not to be confined to the working of an already established traffic in densely populated regions, but that it would be of equal service in awakening the energies of undeveloped countries, in bringing the vast interior regions of the continents into communication with the seaboard, in opening markets to lands which before were beyond the reach of commerce. And it was seen, too, that in event of war a new and invaluable element had been introduced; viz., the power of transportation to an extent never before dreamed of.

Especially were these advantages foreseen in the vast empire of Russia; and an attempt was very early made to induce private capitalists to construct the lines contemplated in that country. The Emperor, besides

guaranteeing to the shareholders a minimum profit of four per cent, proposed to give them gratuitously all the lands of the state through which the lines should pass, and to place at their disposal, also gratuitously, the timber and raw materials necessary for the way and works, which might be found upon the ground. It was further proposed to permit the importation of the rails and the rolling-stock free of duty. Russian proprietors also came forward, and not only agreed to grant such portions of their land as the railroads might pass through, gratuitously, but, further, to dispossess themselves temporarily of their serfs, and surrender them to the use of the companies, on the sole condition that they should be properly supported while thus employed.

With regard to the great line, however, which was to unite the two capitals, St. Petersburg and Moscow, it was decreed that this should be made exclusively at the expense of the state, in order to retain in the hands of the government, and in the general interest of the people, a line of communication so important to the industry and the internal commerce of the empire. The local proprietors agreed to surrender to the government, gratuitously, the lands necessary for this line.

It was very early understood that the railroad problem in Russia was much more analogous to that in the United States than to that in England. The Emperor, therefore, in 1839, sent the Chevalier De Gerstner to

the United States to obtain information concerning the railroads of this country. It was this person who had obtained from the Emperor the concession for the short railroad from St. Petersburg to Zarskoe Selo, which had been opened in 1837, and who had also made a careful reconnoissance in 1835 for a line from St. Petersburg to Moscow, and had very strongly urged its construction on the American plan. The more De Gerstner examined our roads, the more impressed he was with the fitness of what he termed the American system of building and operating railroads, to the needs of the empire of Russia. In one of his letters, in explaining the causes of the cheap construction of American railways, after noting the fact that labor as well as material is much dearer in America than in Europe, he refers to the use of steep grades (ninety-three feet to the mile) and sharp curves (six hundred feet radius) upon which the American equipment works easily; to the use of labor-saving machinery, particularly to a steam-excavating machine on the railroad between Worcester and Springfield; and to the American system of wooden-bridge building; and says, "The superstructure of the railroads in America is made conformable to the expected traffic, and costs therefore more or less accordingly;" and he concludes, "Considering the whole, it appears that the cheapness of the American railroads has its foundation in the prac-

tical sense which predominates in their construction." Again, under the causes of the cheap management of the American roads, he notes the less expensive administration service, the low rate of speed, the use of the eight-wheeled cars, and the four-wheeled truck under the engines; and concludes, "In my opinion, it would be of great advantage for every railroad company in Europe to procure at least one train like those used in America. Those companies, however, whose works are yet under construction, I can advise, with the fullest conviction, to procure all their locomotive engines and tenders from America, and to construct their cars after the American model."

Notwithstanding this report, the suggestions of De Gerstner were not at once accepted. The magnitude of the enterprise would not admit of taking a false step. Further evidence was needed; and, accordingly, it was decided to send a committee of engineer officers to various countries in Europe and to the United States, to select such a system for the road and its equipment, as would be best adapted to Russia. These officers, Cols. Menlikoff and Krofft, not only reported in the most decided manner in favor of the American methods, but also stated that of all persons with whom they had communicated, no one had given them such full and satisfactory information upon all points, or had so impressed them as possessing ex-

traordinary ability, as Major Whistler. This led to his receiving an invitation from the Emperor to go to Russia, to act as consulting engineer for the great road which was to connect the imperial city upon the Baltic with the ancient capital of the Czars.

When we consider the magnitude of the engineering works with which the older countries abound, we can but regard with a feeling of pride the fact that an American should have been selected for so high a trust, by a European government possessing every opportunity and means for securing the highest professional talent which the world could offer. Indeed, the engineers of the Russian service were perhaps the most accomplished body of men to be found in any country. Selected in their youth, irrespective of any artificial advantages of birth or position, but for having a genius for such work, and trained to a degree of excellence in all of the sciences unsurpassed in any country, they stood deservedly in the front rank. Such was the body of men with whom Major Whistler was called to co-operate, and whose professional duties, if not directed specially by him, were to be controlled by his judgment.

Accepting the position offered to him in so flattering a manner, he sailed for St. Petersburg about mid-summer, in 1842, being accompanied on his voyage by Major Bouttatz of the Russian Engineer Corps,

who had been sent to this country by the Emperor as an escort. Arriving in St. Petersburg, and having learned the general character of the proposed work, he travelled, partly by horse and partly on foot, over the entire route, and made his preliminary report, which was at once accepted.

The plan contemplated the construction of a double-track railroad, four hundred and twenty miles long, perfect in all its parts, and equipped to its utmost necessity. The estimates amounted to nearly forty millions of dollars, and the time for its construction was reckoned at seven years. The line selected for the road had no reference to intermediate points, and was the shortest attainable, due regard being paid to the cost of construction. It is nearly straight, and passes over so level a country as to encounter no obstacle requiring a grade exceeding twenty feet to the mile, and for most of the distance it is level. The right of way taken was four hundred feet in width throughout the entire length. The roadbed was raised from six to ten feet above the ordinary level of the country, and was thirty feet wide on top.

One of the most important questions to be settled at the outset, in regard to this great work, was the width of the gauge. At that time the opinion in England, as well as in the United States, among engineers, was setting very strongly in favor of a gauge

wider than four feet eight and a half inches ; and the Russian engineers were decidedly in favor of such increased width. Major Whistler, however, in an elaborate report to Count Kleinmichel, argued very strongly in favor of the ordinary gauge. To this, a commission of the most distinguished engineers in Russia replied, urging in the most decided manner a gauge of six feet. Major Whistler rejoined in a report which is one of the finest models of an engineering argument ever written, and in which we have, perhaps, the best view of the quality of his mind. In this document, no point is omitted ; each part of the question is handled with the most consummate skill ; the bearing of the several parts upon the whole is shown in the clearest possible manner, and in a style which could only come from one who from his own knowledge was thoroughly familiar with all the details, not only of the railroad, but of the locomotive as well.

In this report the history of the gauge is given, with the origin of the standard of four feet eight inches and a half. The questions of strength, stability, and capacity of cars, of the dimensions, proportions, and power of engines, the speed of trains, resistances to motion, weight and strength of rails, the cost of the roadway, and the removal of snow, are carefully considered ; the various claims of the advo-

cates for a wider gauge are fairly and critically examined; and while the errors of his opponents are laid bare in the most unsparing manner, the whole is done in a spirit so entirely unprejudiced, and with so evident a desire for the simple truth, as to carry conviction to any fair-minded person. The dry way, too, in which Major Whistler suggests that conclusions based upon actual results from existing railways are of more value than deductions from supposed conditions, upon imaginary roads, is exceedingly entertaining. The result was the adoption of the gauge recommended by Major Whistler; namely, five feet. Those who remember the "Battle of the Gauges," and who know how much expense and trouble the wide gauge has since caused, will appreciate the stand taken thus early by Major Whistler; and this was but one among many cases which might be mentioned to show how comprehensive and far-reaching was his mind.

The roadway of the St. Petersburg and Moscow Railroad was thirty feet wide on top, for a double track of five feet gauge, with a gravel ballasting two feet deep. The bridges were of wood, of the Howe pattern, no spans being over two hundred feet in length. The stations at each end, and the station and engine houses along the line, were on a plan uniform throughout, and of the most ample accommodation.

Fuel and water stations were placed at suitable points ; and engine-houses were made fifty miles apart, built of the most substantial masonry, circular in form, a hundred and eighty feet in diameter, surmounted by a dome, and having stalls for twenty-two engines each. Repair-shops were attached to every engine-house, furnished with every tool or implement that the wants of the road could suggest.

The equipment of rolling-stock and fixed machinery for the shops was furnished by the American firm of Winans, Harrison, & Eastwick, who from previous acquaintance were known by Major Whistler to be skilful, energetic, and reliable. Much diplomacy was needed to procure the large money advances for this part of the work, the whole Winans contract amounting to nearly five millions of dollars ; but the assurance of Major Whistler was a sufficient guaranty against disappointment or failure.

In 1843 the plans for the work were all complete, and in 1844 the various operations along the line were under way, and proceeding according to the well-arranged programme. In 1844 work had progressed so far that the construction of the rolling-stock was commenced. The locomotives were of two classes,—freight and passenger. The engines of each class were made throughout from the same patterns, so that any part of one engine would fit the same position on

any other. The passenger-engines had two pairs of driving-wheels, six feet in diameter, coupled, and a four-wheeled truck similar to that under the modern American locomotive. The waist of the boiler was forty-seven inches in diameter, and it contained a hundred and eighty-six two-inch tubes ten and a half feet long. The cylinders were sixteen inches in diameter, with a twenty-two-inch stroke. The freight-engines had the same capacity of boiler, and the same number and length of tubes, cylinders eighteen inches in diameter, and a stroke of twenty-two inches, and three pairs of driving-wheels four and a half feet in diameter, all coupled, and a four-wheeled truck, all being uniform throughout in workmanship and finish. The passenger-cars were fifty-six feet long and nine and a half feet wide, the first-class carrying thirty-three passengers, the second-class fifty-four, and the third-class eighty. They all had eight truck-wheels each, and elliptic steel springs. The freight-cars were all thirty feet long and nine and a half feet wide, made in a uniform manner, with eight truck-wheels under each. The imperial saloon carriages were eighty feet long and nine and a half feet wide, having double trucks, or sixteen wheels under each. They were divided into five compartments, and fitted with every convenience.

Early in 1847 the Emperor Nicholas visited the

mechanical works at Alexandroffsky, where the rolling-stock was being made by the Messrs. Winans, in the shops prepared by them, and supplied with Russian labor. Every thing here was on the grandest scale, and the work was conducted under the most perfect system. Upon this occasion the Emperor was so much gratified at what had already been accomplished, that he conferred upon Major Whistler the decoration of the Order of St. Anne. He had previously been pressed to wear the Russian uniform, which he promptly declined to do; but there was no escape from the decoration without giving offence. He is said, however, to have generally contrived to hide it beneath his coat in such a manner that few ever saw it.

Technically, Major Whistler was consulting engineer, Col. Melnikoff being constructing engineer for the northern half of the road, and Col. Krofft for the southern half; but, as a matter of fact, by far the larger part of the labor of planning the construction in detail of both railroad and equipment fell upon Major Whistler. There was also a permanent commission, having the general charge of the construction of the road, of which the president was Gen. Destrem, one of the four French military engineers whom Napoleon, at the request of the Emperor Alexander, sent to Russia for the service of that country.

The year 1848 was a very trying one to Major Whistler. He had already on several occasions overtasked his strength, and had been obliged to rest. This year the Asiatic cholera made its appearance. He sent his family abroad, but remained himself alone in his house. He would on no account at this time leave his post, nor omit his periodical inspections along the line of the road, where the epidemic was raging. In November he had an attack of cholera, and while he recovered from it he was left very weak. He remained, however, upon the work through the winter, though suffering much from a complication of diseases. As spring advanced he became much worse ; and upon the 9th of April, 1849, he passed quietly away, the immediate cause of his death being a trouble with the heart.

Funeral services were held in the Anglican (Episcopal) Church in St. Petersburg. His body was soon afterwards carried to Boston, and deposited beneath St. Paul's Church ; but the final interment took place at Stonington. The kindness and attention of the Emperor, and of all with whom Major Whistler had been associated, knew no bounds. Every thing was done to comfort and aid his wife ; and when she left St. Petersburg, the Emperor sent her in his private barge to the mouth of the Baltic.

"It was not only," says one who knew him well

during his long residence abroad, "through his skill, ability, and experience as an engineer, that Major Whistler was particularly qualified for and eminently successful in the important task he performed so well in Russia; his military training and bearing, his polished manners, good humor, sense of honor, knowledge of a language (French) in which he could converse with officers of the government; his resolution in adhering to what he thought was right, and in meeting difficulties only to surmount them; with other admirable personal qualities, — made him soon, and during his whole residence in Russia, much liked and trusted by all persons by whom he was known, from the Emperor down to the peasant. Such is the reputation he left behind him, and which is given to him in Russia to this day."

In 1849 the firm of Winans, Harrison, & Eastwick had already furnished the road with 162 locomotives, 72 passenger and 2,580 freight cars. They had also arranged to instruct a suitable number of Russian mechanics to take charge of the machinery when completed. The road was finished its entire length in 1850, being opened for passenger and freight traffic on the 25th of September of that year, in two divisions, experimentally, and finally opened for through business on Nov. 1, 1851. In all of its construction and equipment it was essentially American of the

best kind, every thing being made under a carefully devised system, by which the greatest economy in maintenance and in management should be possible. The use of standard patterns, uniformity of design, and duplication of parts, was applied not only to the rolling-stock, but to the railroad as well, wherever it was possible. Indeed, the whole undertaking, in all its parts, bore the impress of one master mind.

On the death of Major Whistler, the government with jealous care prevented any changes whatever being made in his plans, including those which had not been carried out, as well as those already in process of execution. An American engineer, Major T. S. Brown, was invited to Russia to succeed Major Whistler as consulting engineer. The services of the Messrs. Winans, also, were so satisfactory to the government, that a new contract was afterwards made, upon the completion of the road, for the maintenance and the future construction of rolling-stock.

While the great railroad was the principal work of Major Whistler in Russia, he was also consulted in regard to all the important engineering undertakings of the period. The fortifications at Cronstadt, the Naval Arsenal and Docks at the same place, the plans for improving the Dovina at Archangel, the great iron roof of the Riding House at St. Petersburg, and the iron bridge over the Neva, all received his attention.

The government was accustomed to rely upon his judgment in all cases requiring the exercise of the highest combination of science and practical skill ; and here, with a happy tact peculiarly his own, he secured the warm friendship of men whose professional acts he found himself called upon in the exercise of his high trust, in many cases, to condemn. The Russians are proverbially jealous of strangers ; and no higher evidence of their appreciation of the sterling honesty of Major Whistler, and of his sound, discriminating judgment, could be afforded than the fact that all his recommendations on the great questions of internal improvements, opposed as many of them were to the principles which had previously obtained, and which were sanctioned by usage, were yet carried out by the government to the smallest details.

While in Russia, Major Whistler was sometimes placed in positions most trying to him. It is said that some of the corps of native engineers, many of whom were nobles, while compelled to look up to him officially were inclined to look down upon him socially, and exercised their supposed privileges in this respect so as to annoy him exceedingly ; for he had not known in his own country what it was to be the social inferior of any one. The Emperor, hearing of this annoyance, determined to stop it : so, taking advantage of a day when he knew the engineer corps

would visit a celebrated gallery of art, he entered it while they were there, and, without at first noticing any one else, looked around for Major Whistler, and seeing him, went directly towards him, took his arm, and walked slowly with him entirely around the gallery. After this the conduct of the nobles was all that could be desired.

Major Whistler's salary, while in Russia, was twelve thousand dollars a year, a sum no more than necessary for living in a style befitting his position. He had abundant opportunity for making money, but this his nice sense of honor forbade. It is even stated that he would never allow any invention to be used on the road, which could by any possibility be of any profit to himself or to any of his friends. He was continually besieged by American inventors, but in vain. The honor of the profession he regarded as a sacred trust. He served the Emperor with the fidelity that characterized all his actions. His unswerving devotion to his duty was fully appreciated; and it is said that no American in Russia, except John Quincy Adams, was ever held in so high estimation.

Major Whistler married for his first wife Mary, daughter of Dr. Foster Swift of the United-States Army, and of Deborah, daughter of Capt. Thomas Delano of Nantucket. By her he had three children: Deborah, his only daughter, who married Seymour

Hayden of London, a surgeon, but later and better known for his skill in etching ; George William, who became an engineer and railway manager, and who went to Russia, and finally died at Brighton in England, Dec. 24, 1869 ; Joseph Swift, born at New London, Aug. 12, 1825, and who died at Stonington, Jan. 1, 1840. His first wife died Dec. 9, 1827, at the early age of twenty-three years, and is buried in Greenwood Cemetery, in the shade of the monument erected to the memory of her husband by the loving hands of his professional brethren. For his second wife, Major Whistler married Anna Matilda, daughter of Dr. Charles Donald McNeill of Wilmington, N.C., and sister of his friend and associate William Gibbs McNeill. By her he had five sons : James Abbot McNeill, the noted artist, and William Gibbs McNeill, a well-known physician, both now living in London ; Kirk Boott, born in Stonington, July 16, 1838, and who died in Springfield, July 10, 1842 ; Charles Donald, born in Springfield, Aug. 27, 1841, and who died in Russia, Sept. 24, 1843 ; and John Bouttattz, who was born and who died at St. Petersburg, having lived but little more than a year. His second wife, who outlived him, returned to America, and remained here during the education of her children, after which she moved to England, where she died, Jan. 31, 1881, at the age of seventy-six years, being buried at Hastings.

At a meeting held in the office of the Panama Railroad Company in New York, Aug. 27, 1849, for the purpose of suggesting measures expressive of their respect for the memory of Major Whistler, William H. Sidell being chairman, and A. W. Craven secretary, it was resolved that a monument in Greenwood Cemetery would be a suitable mode of expressing the feelings of the profession in this respect, and that an association be formed to collect funds, and to take all necessary steps to carry out the work. At this meeting Capt. William H. Swift was appointed president, Major T. S. Brown treasurer, and A. W. Craven secretary; and Messrs. Horatio Allen, W. C. Young, J. W. Adams, and A. W. Craven were appointed a committee to procure designs and estimates, and to select a suitable piece of ground at Greenwood Cemetery. The design was made by Mr. Adams, and the ground was given by Mr. Kirkwood. The monument is a beautiful structure of red sandstone, about fifteen feet high, and stands in "Twilight Dell." Upon the several faces are the following inscriptions:—

IN MEMORY OF  
 GEORGE WASHINGTON WHISTLER,  
 CIVIL ENGINEER.  
 BORN AT FORT WAYNE, IND., MAY, 1800.  
 DIED AT ST. PETERSBURG, RUSSIA,  
 APRIL, 1849.

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EDUCATED AT THE U.S. MILITARY ACADEMY.  
 HE RETIRED FROM THE ARMY IN 1833, AND  
 BECAME ASSOCIATED WITH WILLIAM GIBBS  
 McNEILL. THEY WERE IN THEIR TIME  
 ACKNOWLEDGED TO BE AT THE HEAD OF  
 THEIR PROFESSION IN THIS COUNTRY.

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HE WAS DISTINGUISHED FOR THEORETICAL  
 AND PRACTICAL ABILITY, COUPLED WITH  
 SOUND JUDGMENT AND GREAT INTEGRITY.  
 IN 1842 HE WAS INVITED TO RUSSIA BY THE  
 EMPEROR NICHOLAS, AND DIED THERE WHILE  
 CONSTRUCTING THE ST. PETERSBURG AND  
 MOSCOW RAILROAD.

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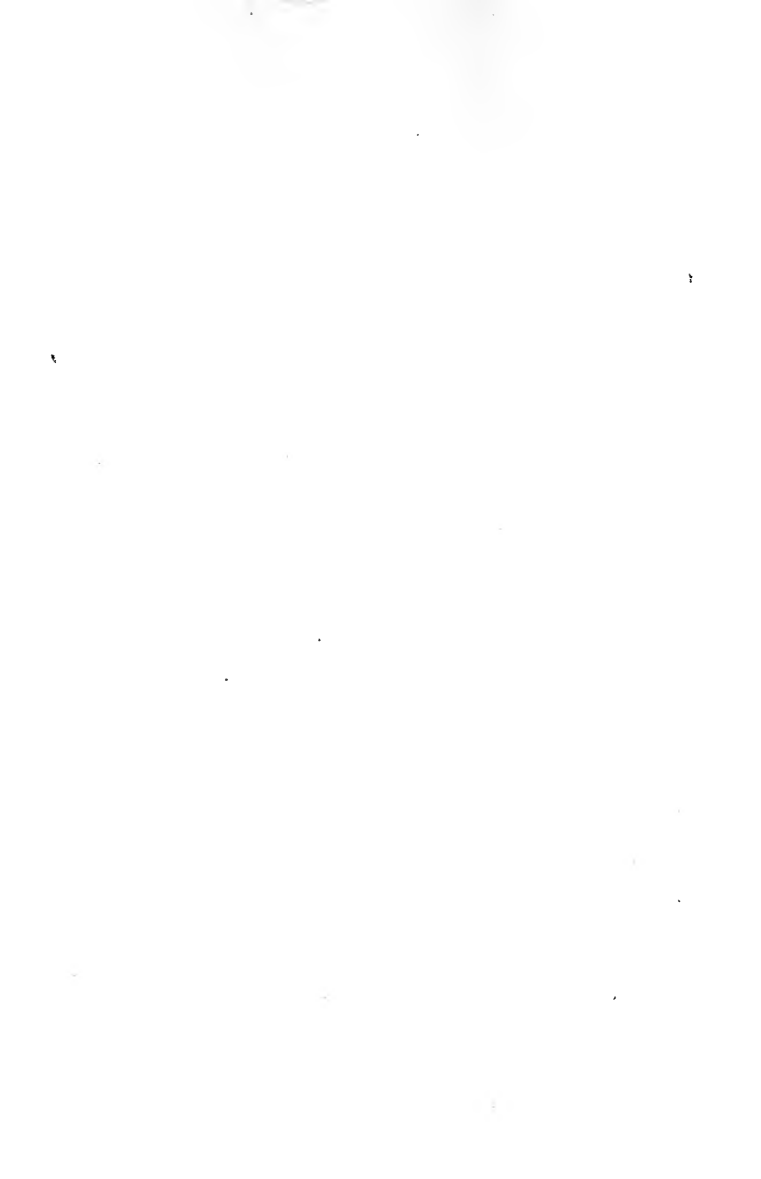
THIS CENOTAPH IS A MEMORIAL OF THE  
 ESTEEM AND AFFECTION OF HIS FRIENDS  
 AND COMPANIONS.

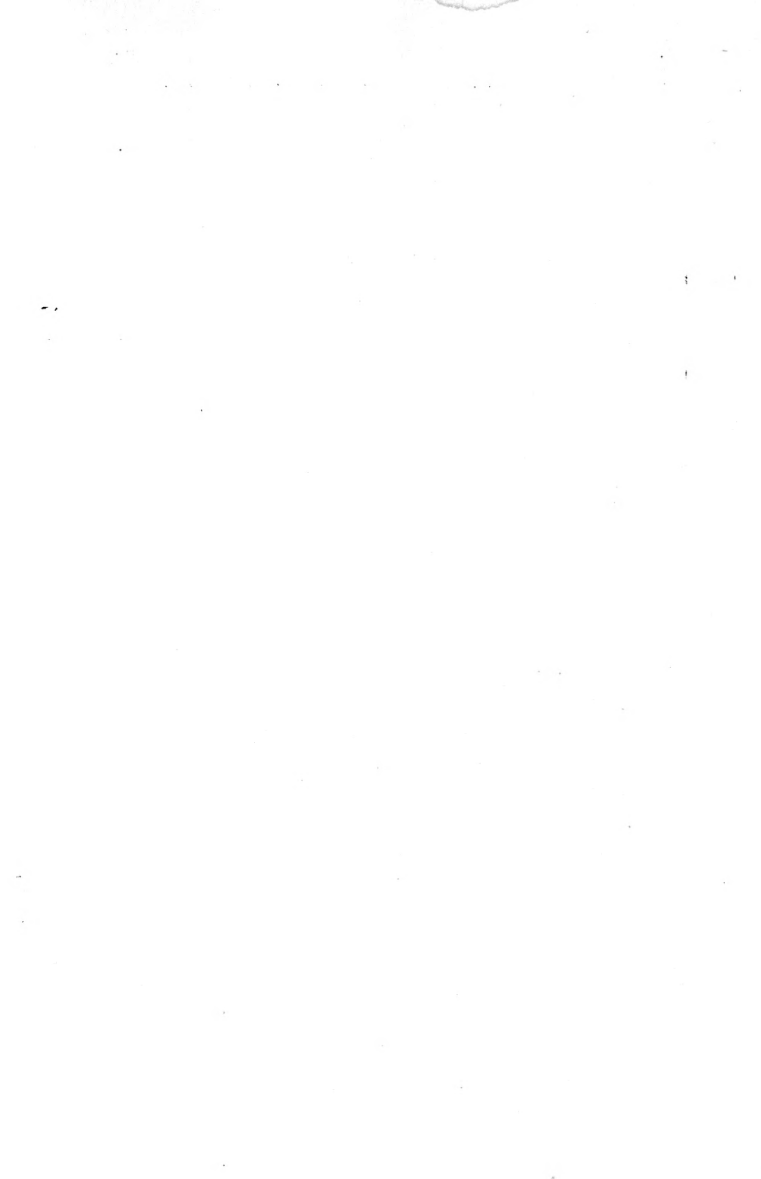
While the monument thus raised to the memory of the great engineer stands in that most delightful of the cities of the dead, his worn-out body rests in the quaint old town of Stonington. It was here that his several children had been buried; and he had frequently expressed a desire, that when he should die he might be placed by their side. A deputation of engineers, who had been in their early years associated with him, attended the simple service which was held over his grave; and all felt, as they turned away, that they had bid farewell to such a man as the world has not often seen.

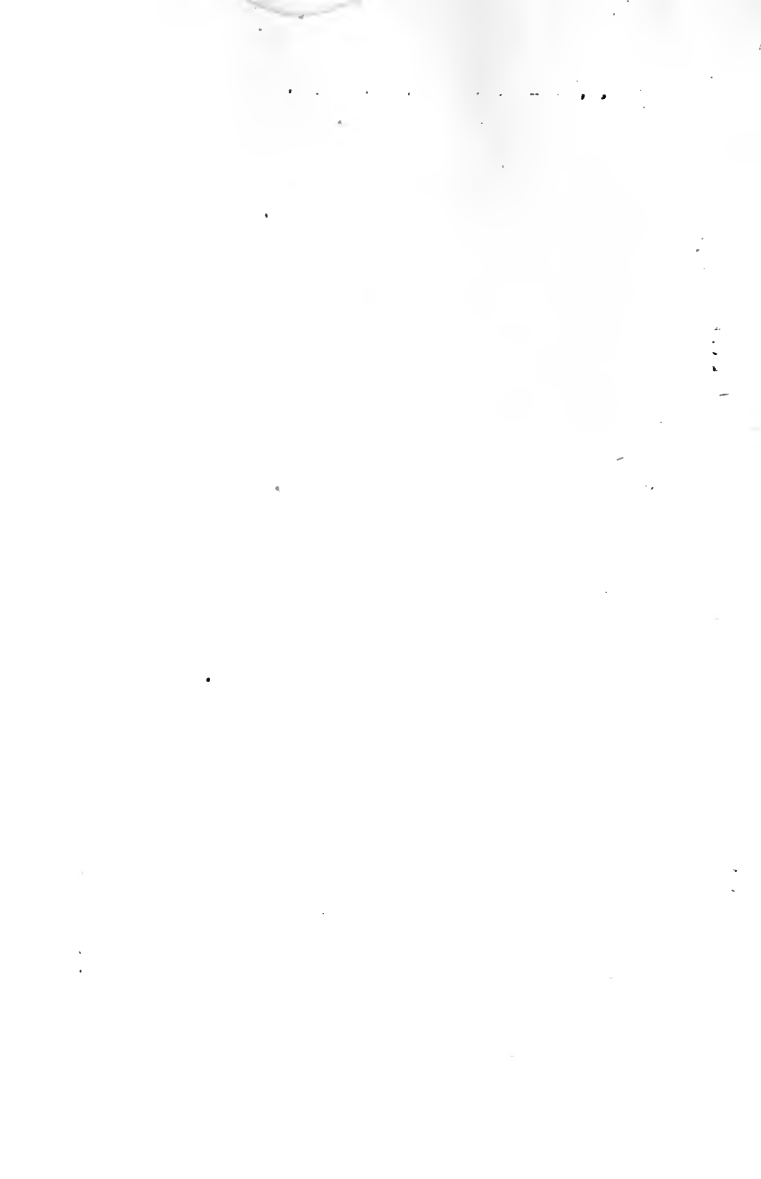
In person, Major Whistler was of medium size and well made. His face showed the finest type of manly beauty, combined with a delicacy almost feminine. In private life he was greatly prized for his natural qualities of heart and mind, his regard for the feeling of others, and his unvarying kindness, especially towards his inferiors and his young assistants. His duties and his travels in this and in other countries brought him in contact with men of every rank; and it is safe to say, that, the more competent those who knew him were to judge, the more highly was he valued by them. A close observer, with a keen sense of humor and unfailing tact, fond of personal anecdote, and with a mind stored with recollections from association with every grade of society, he was

a most engaging companion. The charm of his manner was not conventional, nor due to intercourse with refined society, but came from a sense of delicacy and refinement of feeling which was innate, and which showed itself in him under all circumstances. He was, in the widest and best sense of the word, a gentleman; and he was a gentleman outwardly, because he was a gentleman at heart.

As an engineer, Whistler's works speak for him. He was eminently a practical man, remarkable for steadiness of judgment and for sound business sense. Whatever he did was so well done, that he was naturally followed as a model by those who were seeking a high standard. Others may have excelled in extraordinary boldness, or in some remarkable specialty; but in all that rounds out the perfect engineer, whether natural characteristics, professional training, or the well-digested results of long and valuable experience, we look in vain for his superior; and those who knew him best will hesitate to acknowledge his equal.









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